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IMPROVED EXPLOSIVE COMPOSITION

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(57) Claim

1. A blasting composition comprising ammonium nitrate prills, foamed plastics beads as a gas retaining agent, and a paraffinic oil which is not reactive to the foamed plastics beads, whereby the composition is physically stable and does not tend to settle out during storage and transport to any appreciable degree.

3. A blasting composition as defined in claim 1 or claim 2, wherein the foamed plastics beads are polystyrene beads.

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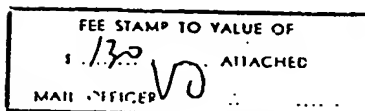
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Complete Specification for the invention entitled: "IMPROVED EXPLOSIVE COMPOSITION"

The following statement is a full description of this invention, including the best method of performing it known to ~~me~~ us:

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This invention relates to explosive compositions, more particularly low cost compositions comprising ammonium nitrate fuel oil compositions commonly then hereafter referred to as A.N.F.O.

5 A.N.F.O. is well known as a blasting agent, and also it is well known to form an explosive mixture by the addition of foamed polystyrene beads which are then placed in the bore hole and detonated for example by a charge of gelignite.

10 As far as the applicants are aware the ammonium nitrate is commercial grade ammonium nitrate, or blasting grade ammonium nitrate and the ammonium nitrate is mixed with the polystyrene beads and the fuel oil or diesel oil immediately prior to being charged into the bore hole.

15 GB Patent No. 1,315,197 discloses an explosive gel composition comprising ammonium nitrate, a liquid hydrocarbon fuel such as diesel oil, a hydrophilic gelling agent, a cross-linking agent and water to prevent the liquid hydrocarbon separating from the gel
20 formed by polystyrene granules also being included. This discloses additives to prevent the separation of the ingredients.

U.S. Patent No. 4,543,137 discloses a water in oil emulsion explosive composition having a carbonaceous fuel, an oxidizer
25 salt, emulsifier, and a gas retaining agent of 0.05 to 40% by weight of bubble assemblies. Each bubble assembly consisting of a large number of bubbles agglomerated into the particle. Various fuels are disclosed including crude paraffin, and ammonium nitrate is one of the oxidizer salts.

30 Patent Application No. AU 29408/71 discloses an explosive composition comprising ammonium nitrate, hydrocarbon fuel (including liquid paraffin), and a surfactant to promote grease formation, and foamed polystyrene. Fuel oil or diesel oil is the
35 preferred fuel.

US Patent No. 3,764,419 is directed to a method of making a blasting agent having variable density. That specification states

that the ingredients must be mutually compatible. For example, diesel fuel oil and other liquid hydrocarbon fuels will "deflate" expanded polystyrene foam beads and in that specification if polystyrene foam beads are used, the fuel component is not diesel fuel.

Hence the use of fuel oil and polystyrene produces a blasting composition which cannot be stored or transported for any length of time.

It has been found that with this composition that the diesel oil, particularly the aromatics in the diesel oil dissolve the polystyrene beads, and also the oil, ammonium nitrate, and beads tend to separate out.

It is an object of this invention to provide a blasting composition which will be economical to produce.

It is a further object of this invention to provide a blasting composition which composition may be premixed and packaged for transport to the blasting area.

It is a further object of this invention to provide a blasting composition in which fertilizer grade ammonium nitrate is utilized in the blasting composition.

Thus there is provided according to the invention a blasting composition comprising ammonium nitrate prills, foamed plastics beads as a gas retaining agent, and a paraffinic oil which is not reactive to the foamed plastics beads, whereby the composition is physically stable and does not tend to settle out during storage and transport to any appreciable degree.

It is a further object of this invention to provide a blasting composition which utilizes the combination of fertilizer grade ammonium nitrate, polystyrene beads and a paraffinic oil.

In a preferred form of the invention great economies are achieved by the use of fertilizer grade ammonium nitrate, and in one example in order to produce the blasting composition, the polystyrene is poured into a silo through a side access door. To ensure that the polystyrene beads do not "float" around the room during this filling process, a fan is operated to maintain a negative air pressure in the silo whilst the loading is in process. The ammonium nitrate is added in the same manner. On completion of the loading the silo doors are closed and the fan turned off. The contents of the silo are then transferred through a blending machine where the paraffinic oil is added after initial mixing is completed.

The blasting composition is then packed in non-porous plastic cartridges ranging from 25mm to 75mm in diameter and 1000mm long. These packages meet the drop test requirements for group 11 packages as specified in the "Australian Code for the Transport of Dangerous Goods by Road and Rail", C of A gazette No. P8. These cartridges are then packed into an outer container which will be an improved textile bag and liner conforming to 5HIC as specified by the "Australian Code for the Transport of Dangerous Goods by Road and Rail", No. P8.

The proportions of the various ingredients can be in the following ranges by weight.

Polystyrene 1 - 15%.

Ammonium Nitrate 75 - 95%.

Paraffinic Oil 1 - 10%.

In one preferred example the proportions of the various ingredients are as follows:

INGREDIENT	VOL. (LITRES)	%	WEIGHT. (Kg)	%
Polystyrene	530.0	74.07	12.7	6.8
Ammonium Nitrate	175.0	24.46	165	88.5
Oil	10.5	1.47	8.8	4.7
TOTAL	715.5	100.00	186.5	100.00

10 It has been found that the aromatics, and other solvents inherent in diesel or fuel oil have the effect of dissolving the polystyrene beads whereas this effect is not achieved by use of the paraffinic oil.

15 An example of the type of oil which can be used can be a paraffinic oil sold by the fuel company under the Trade Mark "Ondina-15", or the Enerpar or an equivalent oil such as commonly called white oils, which may be similar to the previously mentioned oil but not necessarily of the medicinal grade.

20 It has been found that the paraffinic oil does not dissolve the polystyrene beads, and due to the high viscosity of the oil, the polystyrene beads adhere to the ammonium nitrate prills holding them in intimate contact with each other and minimizing segregation. "Ondina-15" has a viscosity in the range of 13.1 to
25 15.6 centistrokes at 40°C while the viscosity of distillate is 2 to 5.6 centistrokes at 40°C.

30 The fertilizer grade ammonium nitrate prills are usually covered with clay or clay like substance, and it has been found that this clay covering retards the absorption of the oil into the ammonium nitrate thus allowing longer intervals for mixing and packaging, the oil still being readily available for combustion.

35 As the explosive mixture is mixed and packed in the same way this ensures that the ammonium nitrate and the polystyrene beads and the oil are homogeneously mixed giving good quality control, reliability and produceability. As the explosive composition is packed in bulk, the higher viscosity of the paraffinic oil ensures the

product reaches the consumer in as close condition as it leaves the factory. The mixture is mixed in a twin ribbon blender at low blending speed ensuring two ingredients of vastly differing densities, that is, the ammonium nitrate having a density of 0.994 kg/l compared with the polystyrene beads which have a density of 0.0235 kg/l adhere to each other by the paraffinic oil, thus these are packaged in packages of varying lengths to suit the usual requirements and this is achieved on a CHUB packaging machine. During this packaging and mixing there is some cracking or bruising of the ammonium nitrate prill allowing the total absorption of the oil into the fertilizer grade ammonium nitrate.

While the example given above refers to the specific proportions of the ingredients, it is to be realized that these can be varied depending upon the explosive nature required and it is to be realized that the invention is not to be limited to the specific details of the mixture.

While it is preferred that polystyrene beads are utilized, it is to be realized that other foamed plastics materials may be used, such as foamed urethane chips, foamed polyethylene chips, and foamed polypropylene.

Although various forms of the invention have been described in some detail it will be realized that the invention is not to be limited thereto but can include variations and modifications falling within the general spirit and scope of the invention.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A blasting composition comprising ammonium nitrate prills, foamed plastics beads as a gas retaining agent, and a paraffinic oil which is not reactive to the foamed plastics beads, whereby the composition is physically stable and does not tend to settle out during storage and transport to any appreciable degree.
2. A blasting composition as defined in claim 1, wherein the ammonium nitrate is fertilizer grade ammonium nitrate.
3. A blasting composition as defined in claim 1 or claim 2, wherein the foamed plastics beads are polystyrene beads.
4. A blasting composition as defined in any one of claims 1 to 3, wherein the paraffinic oil is medical grade paraffin oil.
5. A blasting composition as defined in any one of claims 1 to 3, wherein the paraffinic oil is commercial grade white oil.
6. A blasting composition as defined in any one of claims 1 to 5, wherein the blasting composition comprises the following ingredients by weight, polystyrene 1 - 15% (preferably 6.8%), ammonium nitrate 75 - 95% (preferably 88.7%) and paraffinic oil 1 - 10% (preferably 4.7%).
7. A blasting composition substantially as hereinbefore described with reference to the example.

DATED this 25th day of November, 1987.

E.T.S. SERVICES PTY. LTD.
By their Patent Attorneys,
COLLISON & CO.

